REMARKS/ARGUMENTS

Claims 11-19, 11-24 and 28-34 are pending in the present application. Claims 11-19, 21-24 and 28 were indicated as being rejected in the Office Action Summary. However, in the Office Action itself claims 21-24 were indicated as being withdrawn in paragraph 8. For the purposes of this Response and Amendment, claims 21-24 are being treated as withdrawn. Claims 29-34 were separately indicated as being withdrawn. In response, claim 17 has been canceled, claim 11 has been amended to incorporate the limitation of claim 17 and one limitation of claim 18, and claim 18 has been amended to remove the now redundant limitation. No new matter is added by these amendments. Entry of these amendments is requested.

With Respect to the Withdrawal of Claims 21-24 and 29-34, Paragraphs 5 Through 8 of the Office Action:

Claims 21-24 and 29-34 stand withdrawn for the reasons indicated in paragraphs 5 through 8 of the Office Action, there being no allowable generic or linking claim. For the reasons indicated in this Response and Amendment, the Applicant believes that amended claim 11 is now in condition for allowance. All withdrawn claims, claims 21-24 and 29-34, are dependent on clam 11. Therefore, reconsideration of the withdrawal of claims 21-24 and 29-34 is requested.

With Respect to the Rejections under 35 U.S.C. §102(e), Paragraph 12 of the Office Action:

Claims 11-19, and 28 stand rejected under 35 U.S.C. 102(e) as being anticipated by Stimpson U.S. Patent No. 6,037,186 for the reasons indicated in the paragraph 12 of the Office Action, the Patent and Trademark Office citing the Abstract; col. 3, lines 47-54, among other passages, as follows (emphasis added):

> Two formats are described using porous rods or porous sheet materials. In one format the compounds of the array are immobilized to porous rod elements. In the second format the compounds are immobilized as lines on a sheet of porous material. **In both cases, a bundle is formed by**

> **radial compression of the rods or spiral wrapping of the sheet.** A sheath is applied to the bundle and arrays are cut as slabs.

In response, Claim 11 has been amended to include the limitation "that has been stabilized by embedding the bundle in a material"; incorporating the limitation of claim 17 and one limitation of claim 18. Claim 17 has been canceled and claim 18 has been amended to remove the redundant limitation. The Applicant respectfully submits that originally pending claims 17 and 18, at least, are not anticipated by the '186 Patent for the reasons discussed below, as the Patent and Trademark Office has not identified any disclosure in the '186 Patent that teaches or suggests the limitations of claims 17 and 18.

The entire disclosure of the '186 Patent appears to be limited to creating arrays using radial compression to form a bundle, and then cutting the bundle formed by radial compression. For example, in addition to the above cited passage from the Abstract, the following passages disclose the reliance on radial compression to form the bundle (emphasis added):

> When all array elements are available they are formed into a rod bundle using radial compression about the Z axis of the bundle. The rods may be organized in the bundle by using a guide, i.e., a plate with a series of holes to direct the rods to a particular point of the array. The bundle can be compressed by pulling it through a cone shaped guide. **A sheath is wrapped around the bundle, as in the insulation around a bundle of conducting electrical wires, to hold the elements in place.** The resulting rod bundle is then sliced into multiple arrays along the Z axis. [col. 4, lines 22-31]

> The spools are fed into the guide and pulled through to form a rod bundle with the appropriate go spatial arrangement of rod elements. **A sheath is applied to the rod bundle as it emerges from the guide** and the bundle is either wrapped on a new larger spool or cut into convenient lengths for storage or directly cut into slab arrays. [col. 4, lines 57-63]

> FIG. 2D shows an end view of an array cut from the roll of FIG. 2C after rolling is complete and **the structure is bound with a sheath 260**. The array is a spiral structure of multiple layers of sheet material

210 separated by interstitial spaces 250 and wrapped about a core cylinder 240. [col. 6, line 64 through col. 7, line 1]

After reagent application, the membrane is rolled around a rod shaped support to form a tight spiral of membrane material similar to a "jelly roll". **The outer surface is bound with a material that supplies radial compression (e.g. heat shrink insulation or adhesive tape)** and the resulting roll is cut into individual arrays along the Z axis. In this case, the arrays are spiral in nature with each array element formed by the freshly cut edge of the sheet material impregnated with the various binding agents. **The support rod can be a hollow tube or a solid cylinder.** When a pressure sensitive adhesive is used for the sheath, a few layers of untreated sheet are wrapped on the outside of the spiral to prevent direct contact between the tape and array elements. In this way, the array elements are protected from adhesive migration during cutting. [col. 7, line 66 through col. 8, line 13]

In summary, the invention is directed toward the detection of components in a sample mixture or detection of compounds on an array by:

a) immobilizing binding compounds onto rod shaped array elements;

b) forming a bundle of the rod elements using a guide to create a spatially uniform arrangement of rod elements and **securing with a sheath material**; [col. 12, lines 57-64]

b) rolling the printed sheet into spiral wound structure about a rod and **securing roll with a sheath**; [col. 13, lines 23-24]

c) forming a bundle of the rod elements and **securing with a sheath material**; [col. 13, lines 43-44]

b) forming a bundle of the rod elements and **securing with a sheath material** so that rod elements treated with a given binding agent are grouped to create a graphic symbol/s surrounded by rod elements with different or substantially no affinity for components in the test sample; [col. 13, lines 54-59]

After printing, the sheet was rolled tightly by hand around a plastic straw, and bound with adhesive tape....

> The arrays were surprisingly stable and easily handled even though **the layers of the spiral are only held in place by compression** between the central rod (straw) and the outer sheath (adhesive tape). [col. 14, line 50 through col. 15, line 2]
>
> **The membrane was rolled, bound and cut into slab arrays and placed on a paper towel.** [col. 16, lines 22-23]
>
> b. forming a bundle of compounds in a generally elongated form by collecting the sheet containing the immobilized compounds about a common axis to form an elongated bundle and **wrapping the sheet in a spiral**; and [claim 1; col. 16, lines 43-47]
>
> b. rolling the impregnated sheet into a spiral wound structure about a rod and **securing the structure with a sheath** to form a bundle; [claim 10, col. 17, lines 15-17]

By contrast, the present invention involves stabilizing the target-strands by embedding the bundle in a material, not by radial compression as in the invention disclosed in the '186 Patent. For example, see the following passages in the present application (emphasis added);

> **Stabilizing the Bundle of Target-Strands**
>
> The method of producing high density arrays according to the present invention can also include a step of **stabilizing the bundle of target-strands.** Stabilization can improve the form or the function of the bundle or array, such as making the bundle easier to section, or isolating target substances from each other in the array. The stabilizing step can be performed at any time during or after the assembly of the bundle of target-strands, as is appropriate to the type of stabilization. For example, **stabilization can be accomplished by embedding the bundle of target-strands in a matrix,** such as epoxy, polypropylene or polystyrene. [page 8, lines 3-10]
>
> The fiber are then assembled into bundles with the location of each fiber and its associated immobilized target substance noted in the database. **The bundle of fibers is preferably stabilized by embedding or otherwise impregnating the bundle in a matrix to provide structural support to the bundle.** [page 9, lines 21-24]

If necessary, **the bundle is stabilized such as by embedding or otherwise impregnating the bundle in a matrix to provide structural support to the bundle.** [page 10, line 27 to page 11, line 1]

Referring now to Figures 6 to 8, there are shown respectively, a plurality of membranes 28 having lines of target substances 30 applied on each membranes 28; **the membranes 28 stacked and stabilized to form the bundle 32;** and the bundle 32 being sectioned to produce a plurality of high density arrays 34, where each array has target substances 28 arranged in two analytical axes.

Referring now to Figures 9 to 11, there are shown respectively, a membrane 36 having lines of known target substances 38 applied on membrane 36; **the membrane 36 being rolled and stabilized to form a bundle 40;** and the bundle 40 being sectioned to produce a plurality of high density arrays 42, where each array has target substances 38 arranged in two analytical axis. [page 11, lines 10-19]

The bundle of tubes is preferably stabilized by embedding the bundle in a matrix to provide structural support to the bundle. [page 12, lines 7-8]

The bundle of threads is stabilized by embedding it in a matrix such as polymethacrylate, epoxy resins, polyethylene glycol, paraffin waxes, gums, poly acrylamide and other similar materials which can, preferably, be handled in liquid form at elevated temperature or in unpolymerized form suitable for embedding the threads. The embedded threads are allowed to harden or to crosslink to impart a rigid structure to the bundle. [page 14, lines 3-8]

The stabilized bundle is then sectioned perpendicular to the long axis of the threads using a microtome or similar device to create a plurality of high density arrays preferably having a thickness of between about 0.1 and 100 microns. Each resultant high density array has the same pattern of DNA sequences in specific spatial regions or zones of the array with the target substances arranged in two analytical axis. [page 14, lines 15-19]

The '186 Patent does disclose the use of an adhesive, such as for example (emphasis added):

> **In some cases it may be desirable to use an adhesive compound to bind either the sheets in a stack or the layers of a rolled sheet together to form a cohesive structure.** The adhesive used for this purpose must not migrate during the cutting process used to form the individual arrays or else the edges of the sheet material become covered with adhesive and are not accessible to test solutions. Suitable adhesives for binding the sheets are heat activated-double sided Dow Adhesive Films (Dow Chemical, Midland, Mich.). The important features of adhesive selection are: (1) the adhesive does not wet and thereby occlude the pores of the sheet material before and during setting (2) the adhesive sets to a substantially solid consistency that does not migrate and cover the sheet edges during cutting (3) the set adhesive is not brittle and susceptible to cracking when the individual arrays are released from the bundle or roll and (4) the adhesive is stable to the aqueous solvent of the test sample. In general, pressure sensitive adhesives (e.g. Scotch Tape.RTM., 3M, St. Paul, Minn.) are not desirable because of adhesive migration during mechanical cutting. However, other cutting methods using lasers may allow the use of pressure applied adhesives. One advantage of the roll format over the stack format is that, typically, the compressional forces supplied by the sheath in the rolled structure are sufficient to maintain the integrity of the individual arrays cut from the roll without using any adhesive. This is true for both rod bundles and spiral sheet bundles. [col. 5, line 48 through col. 6, line 7]

However, it appears clear the "adhesive" is not used to embed the bundles, because of the requirement for radial compression, discussed above, which would be unnecessary if the bundles were embedded in a material, because of the specific disclosure regarding the "adhesive" cited below, and because the '186 Patent discloses the existence of "intervening spaces," "interstitial space" and "pores" between the array elements.

> The invention is based on the observation that arrays cut from bundles of porous rods or spiral wound porous sheets behave like membranes composed of said porous materials and conduct flow through the multitude of edges exposed during cutting. Surprisingly, liquid flows substantially through the multiple porous rod or sheets which comprise the array and **not through the intervening spaces between the array elements**. [col. 3, lines 38-46]

> FIG. 2C is a schematic view of the process where by the reagent impregnated sheet 200 is rolled about a cylindrical support 240 to form a

spiral wound structure of multiple layers **separated by an interstitial space 250 between said layers**.

FIG. 2D shows an end view of an array cut from the roll of FIG. 2C after rolling is complete and the structure is bound with a sheath 260. The array is a spiral structure of multiple layers of sheet material 210 **separated by interstitial spaces 250** and wrapped about a core cylinder 240. [col. 6, line 59 through col. 7, line 1]

In some cases it may be desirable to use an adhesive compound to bind either the sheets in a stack or the layers of a rolled sheet together to form a cohesive structure. The adhesive used for this purpose must not migrate during the cutting process used to form the individual arrays or else the edges of the sheet material become covered with adhesive and are not accessible to test solutions. Suitable adhesives for binding the sheets are heat activated-double sided Dow Adhesive Films (Dow Chemical, Midland, Mich.). The important features of adhesive selection are: (1) **the adhesive does not wet and thereby occlude the pores of the sheet material before and during setting** (2) the adhesive sets to a substantially solid consistency that does not migrate and cover the sheet edges during cutting (3) the set adhesive is not brittle and susceptible to cracking when the individual arrays are released from the bundle or roll and (4) the adhesive is stable to the aqueous solvent of the test sample. In general, pressure sensitive adhesives (e.g. Scotch Tape.RTM., 3M, St. Paul, Minn.) are not desirable because of adhesive migration during mechanical cutting. However, other cutting methods using lasers may allow the use of pressure applied adhesives. One advantage of the roll format over the stack format is that, typically, the compressional forces supplied by the sheath in the rolled structure are sufficient to maintain the integrity of the individual arrays cut from the roll without using any adhesive. This is true for both rod bundles and spiral sheet bundles. [col. 5, line 48 through col. 6, line 7]

c) cutting individual arrays from the bundle to expose binding elements formed by the freshly exposed edge of sheet material separated by identification marks and **interstitial space between adjacent membrane layers**, and fixing or placing one side of the array onto an absorbent pad; [col 13, lines 25-30]

For these reasons, amended claim 11 is not believed to be anticipated by the '186 Patent. The remaining claims 12-16, 18 and 28 depend on claim 11. Therefore, withdrawal of

the rejections of claims 11-16, 18 and 28 under 35 U.S.C. 102(e) as being anticipated by Stimpson U.S. Patent No. 6,037,186 is hereby requested.

With Respect to the Rejections under 35 U.S.C. §103(a):

Claims 11-19, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel et al. U.S. Patent No. 5,690,894 and Stimpson U.S. Patent No. 6,307,186 for the reasons indicated on pages 5-7 of the Office Action. The Applicant has examined the '894 Patent and has not located any disclosure which teaches or suggests the limitation added to claim 11 by this Response and Amendment that distinguishes the claimed subject matter over the subject matter disclosed in the '186 Patent. Even if the '894 Patent contained such disclosure, however, the '186 Patent appears to explicitly teach away from the limitation added to claim 11 by this Response and Amendment as discussed in detail above. Hence, such a combination of prior art would not be suitable as the basis for a rejection under 35 U.S.C. 103(a). Therefore, withdrawal of these rejections is requested.

CONCLUSION

For the reason stated above, the Applicant respectfully believes that all pending claims, claims 11-19 and 28 are in condition for allowance and a Notice of Allowance is earnestly solicited. Additionally, the Applicant requests reconsideration of the withdrawal of claims 21-24 and 29-34. If, however, there remain any issues that can be resolved by telephone with the Applicants representative, the Examiner is encouraged to contact the undersigned directly.

If any extension of time is required, such extension is hereby requested. No fee is believed due in connection with this communication. However, if any fee is due, the Commissioner is hereby authorized to charge payment of the fee associated with this communication to Deposit Account No. 19-2090.

Respectfully submitted,

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Date: September 10, 2003

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Serial No.:	09/827,505	**Group Art Unit:**	1639
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